

REMARKS

Claims 1-2, 4-10, 15 and 17-19 are in the application, with Claims 1, 2, 5, 6, 8 and 15 having been amended. Claims 1, 8 and 15 are the independent claims herein. No new matter has been added. Reconsideration and further examination are respectfully requested.

Claims 1, 2 and 4-9 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,489,676 (Taniguchi) in view of U.S. Patent No. 7,145,225 (Lee); Claim 10 was rejected under §103 over Taniguchi in view of Lee and in view of U.S. Patent No. 5,422,435 (Takiar); and Claims 15-19 were rejected under §103 over Taniguchi in view of Lee and further in view of U.S. Publication No. 2002/0196650 (Chang). Reconsideration and withdrawal of the rejections are respectfully requested.

Claims 1 and 15

Claim 1 concerns an apparatus including an integrated circuit die, an integrated circuit package coupled to the integrated circuit die, mold compound in contact with the integrated circuit die and the integrated circuit package, and a first solder ball in contact with the integrated circuit package. The apparatus also includes a second integrated circuit package and a second solder ball in contact with the second integrated circuit package. A first portion of the first solder ball is in contact with the mold compound, and a second portion of the first solder ball is not in contact with the mold compound. The mold compound defines an opening, and the second portion of the first solder ball is recessed beneath the opening. Additionally, a third portion of the first solder ball is in contact with the integrated circuit package, and the second solder ball is in contact with the first solder ball within the opening.

The art of record is not seen to disclose or suggest the features of Claim 1, particularly with respect to a first solder ball in contact with an integrated circuit package, in which a second portion of a first solder ball in contact with the integrated circuit package is not in contact with the mold compound and is recessed beneath the opening, and in which a second solder ball in contact with a second integrated circuit package is in contact with the first solder ball.

FIGS. 8 and 9 of Taniguchi show semiconductor devices 20b and 20c, each including copper posts 18a and 18b. Post 18b is formed in post hole 30 (col. 7, lines 38-39) such that an end of post 18b is "exposed on the outer surface of sealing resin 8" (col. 7, lines 58-59). Copper posts 18a and 18b cannot reasonably be seen to disclose or to suggest a solder ball in contact with an integrated circuit package. The newly cited Lee reference is not to remedy the deficiencies in Taniguchi.

FIG. 3 of Lee shows structures 34 coupled to upper package 121U. Structures 34 are coupled to third contact pads 16, which are in turn coupled to vias 15 and second contact pads 2, or to conductive traces 8 and first contact pads 4. The multi-element conductive structures 16/15/2 and 16/8/4 cannot be seen to disclose or suggest the claimed first solder ball.

The Office Action alleges that structure 34 is analogous to the "second" solder ball of Claim 1. Accordingly, even if the above-mentioned allegation were accurate, Lee would still fail to disclose or to suggest a first solder ball in contact with an integrated circuit package, in which a second portion of the first solder ball is not in contact with mold compound and is recessed beneath an opening of the mold compound, and in which a second solder ball in contact with a second integrated circuit package is in contact with the first solder ball.

Claim 1 and its associated dependent claims are therefore believed to be allowable. Claim 15 includes features similar to those described above with respect to Claim 1, and was rejected over Taniguchi and Lee in view of Chang. As Chang is not seen to remedy the above-described deficiencies in Taniguchi and Lee, Claim 15 and its dependent claims are also believed to be allowable.

Claim 8

Claim 8 concerns an apparatus that includes an integrated circuit package substrate. A plurality of integrated circuit die are coupled to the integrated circuit package substrate. A mold compound is in contact with the plurality of integrated circuit die and the integrated circuit package substrate. A first solder ball is in contact with the integrated circuit package substrate

and electrically coupled to one of the plurality of integrated circuit die. The apparatus also includes a second integrated circuit package, and a second solder ball in contact with the second integrated circuit package. A first portion of the first solder ball is in contact with the mold compound, a second portion of the first solder ball is not in contact with the mold compound, and the mold compound defines an opening. The second portion of the first solder ball is recessed beneath the opening, a third portion of the first solder ball is in contact with the integrated circuit package substrate, and the second solder ball is in contact with the first solder ball within the opening.

As described above, Taniguchi is only seen to describe a system in which a solder ball (i.e., solder ball 6) coupled to a second integrated circuit package contacts a copper post (18a or 18b) coupled to a first integrated circuit package at an upper surface of sealing resin 8. Lee shows multi-element conductive structures 16/15/2 and 16/8/4 in contact with a first integrated circuit package and with structures 34 coupled to upper package 121U.

Accordingly, Taniguchi and Lee, alone or in any permissible combination, cannot be seen to disclose or to suggest a first solder ball in contact with an integrated circuit package substrate, in which a second portion of the first solder ball is not in contact with mold compound and is recessed beneath an opening of the mold compound, and in which a second solder ball in contact with a second integrated circuit package is in contact with the first solder ball. Claim 8 and all claims depending therefrom are believed to be in condition for allowance.

CONCLUSION

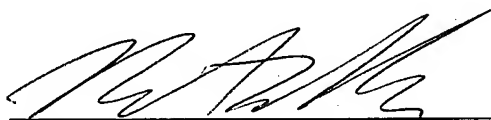
The outstanding Office Action presents a number of characterizations regarding each of the applied references, some of which are not directly addressed herein because they are not related to the rejections of the independent claims. Applicant does not necessarily agree with the characterizations and reserve the right to further discuss those characterizations.

For at least the reasons given above, it is submitted that the entire application is in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience. Alternatively, if there remains any question regarding the present application or any of the cited references, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is cordially requested to contact the undersigned via telephone at (203) 972-0049.

Respectfully submitted,

March 19, 2007

Date



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